

We claim:

1. In a computer network, said network including a plurality of nodes and trunks, a method for configuring said network, said method comprising the steps of:
  - 5 providing, at a selected node, software containing routing algorithms, said routing algorithms calculating routing paths for said network traffic, said network traffic originating at a source node and travelling to a destination node;
    - 10 configuring a plurality of said nodes in said network through the use of said software so as to form a virtual ring composed of said nodes and trunks, said virtual ring containing a plurality of working trunks and a plurality of protection trunks, said virtual ring containing a designated entry node for each circuit designating the node through which network traffic passes from the nodes in the rest of the network which are not part of said virtual ring into said virtual ring, and said virtual ring further containing a designated exit node for each circuit, said exit node designating the node through which
     - 15 traffic passes from said virtual ring to other nodes in the rest of the network which are not part of the virtual ring.
  2. The method of claim 1 wherein the number of protection trunks between any two adjacent nodes in a selected virtual ring equals the maximum number of working trunks
   - 20 between any other adjacent nodes in said selected virtual ring.
  - 3. The method of claim 1 wherein traffic is routed through said virtual ring such that the virtual ring is treated as a single node during the calculation of said routing paths.
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  - 4. The method of claim 1 wherein said routing paths include a plurality of trunks in said virtual ring.
  - 5. The method of claim 1 wherein said virtual ring is overlaid on a network
   - 30 possessing a mesh topology.
  - 6. The method of claim 1 wherein said virtual ring is contained within a single Open Shortest Path First ( OSPF ) area.

7. In a computer network, said network including a plurality of nodes and trunks, a method for configuring said network, said method comprising the steps of:

- providing, at a selected node, software containing routing algorithms, said
- 5 routing algorithms calculating paths for said network traffic, said path for network traffic originating at a source node and travelling to a destination node;
- configuring a plurality of said nodes in said network through the use of said software so as to form a virtual ring composed of said nodes and trunks, said virtual ring containing a plurality of working trunks and a plurality of protection trunks, said virtual
- 10 ring containing a designated entry node for each circuit designating the node through which network traffic passes from the nodes in the rest of the network which are not part of said virtual ring into said virtual ring, and said virtual ring further containing a designated exit node for each circuit, said exit node designating the node through which traffic passes from said virtual ring to other nodes in the rest of the network which are
- 15 not part of the virtual ring; and
- repairing a failure in said path in said virtual ring, by calculating new routes for network traffic, said new route originating at said ring entry node and traveling through said ring exit node without traveling through the failed path.

20 8. The method of claim 7 wherein said virtual ring is contained within a single Open Shortest Path First ( OSPF ) area.

9. The method of claim 7 wherein the routing process for said network includes a signaling component and an optical routing component.

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10. The method of claim 9 wherein the signaling component signals said optical routing component that the signaling component is performing a recovery from said failure.

30 11. The method of claim 10 wherein said optical routing component switches said path to include a protection trunk.

12. The method of claim 7 wherein an alarm indicating signal ( AIS ) is used to signal a path failure within said virtual ring.

13. The method of claim 7 wherein a path failure in said virtual ring is repaired by reprogramming cross-connects to use a secondary circuit path.

14. In a computer network, said network including a plurality of nodes and trunks, a method for configuring said network, said method comprising the steps of:

providing, at a selected node, software containing routing algorithms, said  
10 routing algorithms calculating paths for said network traffic, said path for network traffic originating at a source node and travelling to a destination node;  
configuring a plurality of said nodes in said network through the use of said software so as to form a virtual ring composed of said nodes and trunks, said virtual ring containing a plurality of working trunks and a plurality of protection trunks, said virtual  
15 ring containing a designated entry node for each circuit designating the node through which network traffic passes from the nodes in the rest of the network which are not part of said virtual ring into said virtual ring, and said virtual ring further containing a designated exit node for each circuit, said exit node designating the node through which traffic passes from said virtual ring to other nodes in the rest of the network which are  
20 not part of the virtual ring; and  
configuring said virtual ring so as to assign a protection trunk to more than one calculated path through said virtual ring.

15. The method of claim 14 wherein the routing process for said network includes a signaling component and an optical routing component.

16. The method of claim 15 wherein the signaling component signals said optical routing component that the signaling component is performing a recovery from said failure.

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17. The method of claim 16 wherein said optical routing component switches said path to include a selected protection trunk.

18. The method of claim 17 wherein said selected protection trunk is the protection trunk for more than one calculated path through said virtual ring.

19. The method of claim 18 further comprising the steps of:

5       said entry node receiving notice of a failed working path through said virtual ring;

          switching network traffic through said virtual ring to said selected protection trunk as part of a replacement path through said virtual ring;

          repairing said failed working path through said virtual ring; and

10       switching network traffic through said virtual ring from said replacement path back to said working path.

20. The method of claim 14 wherein said virtual ring is contained within a single Open Shortest Path First ( OSPF ) area.

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